

CLAIMS

What is claimed is:

1. A method for classifying disordered breathing in a patient, comprising:
5 detecting a disordered breathing event;
sensing motion associated with respiratory effort during the disordered
breathing event; and
classifying the disordered breathing event based on the sensed motion,
wherein at least one of detecting, sensing, and classifying is performed at least in
10 part implantably.
2. The method of claim 1, wherein at least two of detecting, sensing, and
classifying are performed at least in part implantably.
- 15 3. The method of claim 1, wherein all of detecting, sensing, and classifying
are performed at least in part implantably.
- 4 The method of claim 1, wherein the disordered breathing event comprises
Cheyne-Stokes respiration.
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5. The method of claim 1, wherein the disordered breathing event comprises
periodic breathing.
6. The method of claim 1, wherein the disordered breathing event comprises
25 apnea.
7. The method of claim 1, wherein the disordered breathing event comprises
hypopnea.

8. The method of claim 1, wherein the disordered breathing event comprises sleep disordered breathing.

5 9. The method of claim 1, wherein detecting the disordered breathing event comprises detecting the disordered breathing event based on respiration patterns.

10. The method of claim 1, wherein detecting the disordered breathing event comprises detecting the disordered breathing event based on blood gas level.

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11. The method of claim 1, wherein detecting the disordered breathing event comprises detecting the disordered breathing event based on transthoracic impedance measurements.

15 12. The method of claim 1, wherein detecting the disordered breathing event comprises detecting the disordered breathing event based on respiratory system conditions.

20 13. The method of claim 1, wherein detecting the disordered breathing event comprises detecting the disordered breathing event based on cardiovascular system conditions.

25 14. The method of claim 1, wherein detecting the disordered breathing event comprises detecting the disordered breathing event based on cardiopulmonary conditions.

15. The method of claim 1, wherein detecting the disordered breathing event comprises detecting the disordered breathing event based on nervous system conditions.

16. The method of claim 1, wherein detecting the disordered breathing event comprises detecting the disordered breathing event based on non-physiological conditions.

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17. The method of claim 1, wherein sensing the motion associated with respiratory effort during the disordered breathing event comprises sensing chest wall motion associated with the respiratory effort.

10 18. The method of claim 1, wherein sensing the motion associated with respiratory effort during the disordered breathing event comprises sensing abdominal motion associated with respiratory effort.

15 19. The method of claim 1, wherein sensing the motion associated with respiratory effort during the disordered breathing event comprises distinguishing the motion associated with respiratory effort from other types of motion.

20 20. The method of claim 1, wherein classifying the disordered breathing event comprises classifying the disordered breathing event as a central disordered breathing event.

21. The method of claim 1, wherein classifying the disordered breathing event comprises classifying the disordered breathing event as an obstructive disordered breathing event.

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22. The method of claim 1, wherein classifying the disordered breathing event as a mixed central and obstructive disordered breathing event.

23. The method of claim 1, wherein classifying the disordered breathing event comprises classifying the disordered breathing event as an obstructive disordered if the motion associated with respiratory effort during the disordered breathing event is equal to or above a motion threshold.

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24. The method of claim 1, wherein classifying the disordered breathing event comprises classifying the disordered breathing event as a central disordered breathing event if motion associated with respiratory effort is below a motion threshold.

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25. The method of claim 1, wherein classifying the disordered breathing event comprises classifying the disordered breathing event as a mixed central and obstructive disordered breathing event if the motion associated with respiratory effort is equal to or above a motion threshold during a first portion of the disordered breathing event and the motion associated with respiratory effort is below the motion threshold during a second portion of the disordered breathing event.

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26. The method of claim 1, wherein classifying the disordered breathing event comprises discriminating between central disordered breathing and obstructive disordered breathing.

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27. The method of claim 1, further comprising storing information associated with the disordered breathing event.

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28. The method of claim 1, further comprising transmitting information associated with the disordered breathing event.

29. The method of claim 1, further comprising displaying information associated with the disordered breathing event.

30. The method of claim 1, further comprising using the classification of the disordered breathing event to evaluate disordered breathing trends.

31. The method of claim 1, further comprising delivering a therapy to treat disordered breathing based on the classification of the disordered breathing event.

32. The method of claim 1, further comprising modifying a therapy delivered to the patient based on the classification of the disordered breathing event.

33. The method of claim 32, wherein the modified therapy is a disordered breathing therapy.

34. A system for classifying disordered breathing, comprising:

a disordered breathing detector configured to detect a disordered breathing event;

a motion sensor configured to sense motion associated with respiratory effort of a patient during the disordered breathing event; and

a disordered breathing classification processor coupled to the motion sensor and the disordered breathing detector, the disordered breathing classification processor configured to classify the disordered breathing event based on the respiratory effort motion, wherein at least one of the disordered breathing detector, the motion sensor, and the disordered breathing classification processor is at least in part implantable.

35. The system of claim 34, wherein at least two of the disordered breathing detector, the motion sensor, and the disordered breathing classification processor are at least in part implantable.

5 36. The system of claim 34, wherein the disordered breathing detector, the motion sensor, and the disordered breathing classification processor are at least in part implantable.

37. The system of claim 34, wherein the disordered breathing detector
10 comprises a sensor configured to sense patient respiration.

38. The system of claim 37, wherein the respiration sensor comprises a transthoracic impedance sensor.

15 39. The system of claim 37, wherein the respiration sensor comprises a microphone configured to detect snoring sounds.

40. The system of claim 37, wherein the respiration sensor comprises an
20 airflow sensor.

41. The system of claim 37, wherein the respiration sensor comprises a sensor configured to sense blood gas.

42. The system of claim 34, wherein the disordered breathing detector
25 comprises a sensor configured to sense cardiovascular system conditions.

43. The system of claim 34, wherein the disordered breathing detector comprises a sensor configured to sense respiration system conditions.

44. The system of claim 34, wherein the disordered breathing detector comprises a sensor configured to sense nervous system conditions.

45. The system of claim 34, wherein the disordered breathing detector
5 comprises a sensor configured to sense muscle system conditions.

46. The system of claim 34, wherein the disordered breathing detector comprises a sensor configured to sense non-physiological conditions.

10 47. The system of claim 34, wherein the motion sensor comprises an accelerometer.

48. The system of claim 34, wherein the motion sensor comprises a transthoracic impedance sensor.

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49. The system of claim 34, wherein the motion sensor comprises a respiratory band.

50. The system of claim 34, wherein the motion sensor comprises a switch.

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51. The system of claim 34, wherein the motion sensor comprises an electromyogram sensor.

52. The system of claim 34, wherein the motion sensor is configured to sense
25 chest wall motion.

53. The system of claim 34, wherein the motion sensor is configured to sense abdominal motion.

54. The system of claim 34, wherein the disordered breathing classification processor is configured to classify the disordered breathing event as a central disordered breathing event.

5 55. The system of claim 34, wherein the disordered breathing classification processor is configured to classify the disordered breathing event as an obstructive disordered breathing event.

10 56. The system of claim 34, wherein the disordered breathing classification processor is configured to classify the disordered breathing event as a mixed central and obstructive disordered breathing event.

15 57. The system of claim 34, wherein the disordered breathing classification processor is configured to discriminate between central and obstructive disordered breathing.

20 58. The system of claim 34, wherein the disordered breathing classification processor is configured to classify the disordered breathing event as an obstructive disordered breathing event if the motion associated with respiratory effort during the disordered breathing event is equal to or above a motion threshold.

25 59. The system of claim 34, wherein the disordered breathing classification processor is configured to classify the disordered breathing event as a central disordered breathing event if the motion associated with respiratory effort during the disordered breathing event is below a motion threshold.

60. The system of claim 34, wherein the disordered breathing classification processor is configured to classify the disordered breathing event as an obstructive disordered breathing event if the motion associated with respiratory effort during the disordered breathing event is equal to or above a motion threshold during a first portion of the disordered breathing event and classify the disordered breathing event as a central disordered breathing event if the motion associated with respiratory effort during the disordered breathing event is below a motion threshold during a second portion of the disordered breathing event.

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61. The system of claim 34, wherein the disordered breathing classification processor is configured to distinguish between the motion associated with respiratory effort and other types of motion.

15 62. The system of claim 34, wherein at least one of the motion sensor and the disordered breathing detector is wirelessly coupled to the disordered breathing classification processor.

20 63. The system of claim 34, wherein at least one of the motion sensor, the disordered breathing detector, and the disordered breathing classification processor is mechanically coupled to a cardiac rhythm management device.

25 64. The system of claim 34, wherein at least one of the motion sensor, the disordered breathing detector, and the disordered breathing classification processor is mechanically coupled to a positive airway pressure device.

65. The system of claim 34, wherein at least one of the motion sensor, the disordered breathing detector, and the disordered breathing classification processor are coupled to a patient management system.

66. The system of claim 34, further comprising a memory coupled to the disordered breathing classification processor and configured to store information about the disordered breathing event.

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67. The system of claim 34, further comprising a display device coupled to the disordered breathing classification processor and configured to display information about the disordered breathing event.

10 68. The system of claim 34, further comprising a therapy unit coupled to the disordered breathing classification processor and configured to deliver therapy to the patient to treat disordered breathing.

69. The system of claim 34, further comprising a therapy delivery unit coupled
15 to the disordered breathing classification processor and configured to modify a therapy delivered to the patient based on the classification of the disordered breathing event.

20 70. A disordered breathing classification system, comprising:
means for detecting a disordered breathing event;
means for sensing motion associated with respiratory effort during the disordered breathing event; and
means for classifying the disordered breathing event based on the sensed motion, wherein at least one of the means for sensing, the means for detecting,
25 and the means for classifying is at lease partially implantable.

71. The system of claim 70, further comprising means for storing information associated with the disordered breathing event.

72. The system of claim 70, further comprising means for transmitting information associated with the disordered breathing event.

73. The system of claim 70, further comprising means for displaying
5 information associated with the disordered breathing event.

74. The system of claim 70, further comprising means for using the classification of the disordered breathing event to evaluate disordered breathing trends.

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75. The system of claim 70, further comprising means for delivering a therapy for disordered breathing based on the classification of the disordered breathing event.

15 76. The system of claim 70, further comprising means for modifying a therapy delivered to the patient based on the classification of the disordered breathing event.